Targetting Multifunctional Bakery Products – an Update

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MF Bake stands for multifunctional bioingredients developed for bakery products. After one year this CTI-funded project received a GO-decision along with encouraging words from CTI – *"has potential for a success story"*. It brings together a unique interdisciplinary group: four ZHAW research groups are working with the Laboratory of Food Biotechnology at ETHZ (Institute of Food, Nutrition and Health, IFNH); and three industry partners: Bakels AG, Coop, and Bioforce AG.

Overall aim

MF Bake ingredients contain many functional substances of interest: organic acids and other low-molecular weight compounds with antimicrobial activities; folate and vitamin B_{12} in balanced and nutritionally-relevant levels; and other substances with possible beneficial effects on bread structure. These substances are naturally produced by mixed *Lactobacillus* and *Propionibacterium* cultures, using fermentation technology (1, 2) developed by partner ETHZ. The potential for longer shelf life, increased vitamin content and other advantages for bakery products is driving the project forward.

Working as a team

In collaboration with project partners, ZHAW Bakery Group is testing different MF Bake ingredients in baking applications, fine-tuning to the needs of the Industry (Fig. 2). Nutrition and Consumer Science is responsible for coordination, leading ZHAW research and advising on the vitamins. Sensory is assessing product flavor and aroma, targeting consumer acceptability and preferences; and ZHAW Microbiology is investigating antimicrobial effects. Results are encouraging and now the technology is being transferred to industry scale. This important milestone aims to bring MF Bake ingredients closer to the market.

Milestones successfully reached at ZHAW

Pilot-scale baking tests were done on Semmeli breads at ZHAW bakery, using two types of MF Bake ingredients. Three different bread stages were studied: dough; partly- and fully-baked. Standard baking analyses (i. e. pH, dry matter, total acidity, texture, volume) and sensory assessment were done at ZHAW; then compared with vitamin and organic acids, determined at ETHZ. Semmeli enriched with MF ingredients showed good bread-making characteristics, suitable for industry. Observed differences are being investigated. Shelf life tests were also carried out on MF Bake Semmeli spiked with three bread spoilage molds. A significant antifungal activity was observed and mold growth was delayed by several days during storage at 5 or 25 °C.

MF Bake ingredients allowed to enrich Semmeli naturally with both folate and active vitamin B_{12} to significant levels (Fig. 1). Standard bread has no B_{12}. Furthermore the main folate derivative in MF Bake Semmeli, (metabolically active methyltetrahydrofolate), was more heat stable than wheat-flour folate.

What next?

The team will continue to develop this multifunctional ingredient, motivated by an outlook of added value and improved shelf life of bakery products. Such advantages might quickly attract the interest of other food sectors.

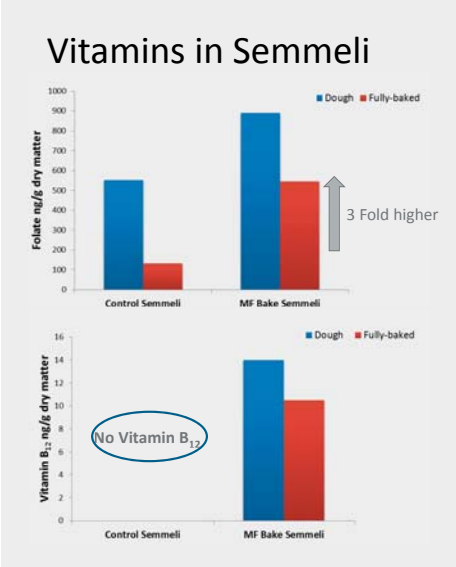

Fig. 1 Vitamin Levels in Semmeli.

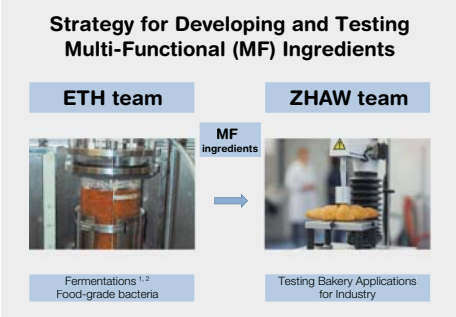

Fig. 2 Strategy for Developing and Testing Multi-Functional (MF) Ingredients.

Forschungsprojekt

Multifunctional bakery bioingredients

Leitung:	Janice Sych
Projektdauer:	2009 bis 2012
Partner:	ETHZ, Bakels AG, Coop and Bioforce AG
Förderung:	CTI, Anschubsfinanzierung, Industry
Projektvolumen:	CHF 200 000 (for ZHAW)

References

1. 2010 Hugenschmidt, S., Miescher Schwenninger, S., Lacroix, C. Patent WO2010078670-A2 202010078670-A3
2. 2011 Hugenschmidt, S., Miescher Schwenninger, S., Lacroix, C. Concurrent high production of natural folate and vitamin B_{12} using a co-culture process with *Lactobacillus plantarum* SM39 and *Propionibacterium freudenreichii* DF13. Process Biochemistry, 46: 1063–1070.